

Project: Home Service Robot

The goal of this project is to program a robot that can autonomously map and environment and navigate to pick up and dropped virtual objects.

I used the following Official ROS packages

1. [gmapping](#): To perform SLAM.
2. [turtlebot_teleop](#): To manually control the robot in order to perform SLAM.
3. [turtlebot_rviz_launchers](#): To visualise the environment and map.
4. [turtlebot_gazebo](#): Used turtle bot in gazebo as my robot.

I also build the following two packages and wrote nodes for respective purposes.

1. `pick_objects`: a node that commands your robot to drive to the pickup and drop off zones.
2. `add_markers`: a node that model the object with a marker in rviz.

I also wrote **shell scripts** to handle running of all the packages appropriately and with ease. I used **xterm** to run the shell scripts. This saved a lot of time and unnecessary mistakes.

The results of the SLAM we not very good, so, I also use **pgm map creator** to build a good quality map.

The Project was divided into parts:

1. **SLAM Testing**: To autonomously map the environment I designed. In this section **gmapping** (in this case part of `turtlebot_gazebo` package) package was used.
2. **Localization and Navigation Testing**: To pick two different goals and test your robot's ability to reach them and orient itself with respect to them. These goals are referred as the pickup and drop off zones. We used **AMCL** (in this case part of `turtlebot_gazebo` package) to localise our robot.
3. **Reaching Multiple Goals**: I wrote a `pick_objects` node that will communicate with the ROS navigation stack and autonomously send successive goals for robot to reach.
4. **Modelling Virtual Objects**: I modelled a virtual object with markers in rviz. The virtual object is the one being picked and delivered by the robot; thus, it first appears in its pickup zone, and then in its drop off zone once the robot reaches it. `Add_markes`

package was created for the purpose using the official ROS **Markers: Basic Shapes** tutorial.

5. **Home Service Robot:** Now the final step was to combine everything and create the following behaviour:
 - a. Publish the marker at the pickup zone.
 - b. Pause 5 seconds.
 - c. Hide the marker.
 - d. Pause 5 seconds.
 - e. Publish the marker at the drop off zone.